MATHS

BOOKS - VIKRAM PUBLICATION (ANDHRA PUBLICATION)

STRAIGHT LINE

Solved Problems

1. Find the equation of the straight line passing through the point $(2, 3)$ and making intercepts, whose sum is zero.

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2. Find the equation of the straight line passing through the points $\left(at_1^2, 2at_1\right), \left(at_2^2, 2at_2\right)$.

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3. Find the equation of the straight line passing through A(-1,3) and (i) parallel (ii) perpendicular to the straight line passing through B(2,-5),C(4,6)

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4. Prove that the points $(1, 11), (2, 15), (-3, -5)$ are collinear and find the equation of the straight line containing them.

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5. A straight line passing through $A(1, -2)$ makes an angle $\frac{\tan^{-1} 4}{3}$ with the positive direction of the X-axis in the anticlock wise sense. Find the point on the straight line whose distance from A is 5 units.

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6. A straight line parallel to the line $y = \sqrt{3}x$ passes through Q(2,3) and cuts the line $2x + 4y - 27 = 0$ at P. Find the lengh of PQ.

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7. Transform the equation $3x + 4y + 12 = 0$ into slope intercept form

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8. Transform the equation $3x + 4y + 12 = 0$ into

intercept form

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9. Transform the equation $3x + 4y + 12 = 0$ into

Normal form

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10. If the area of the triangle formed by the straight lines $x = 0, y = 0$ and $3x + 4y = a(a > 0$ is 6. Find the value of a.

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11. Find the value of k if the lines $2x - 3y + k = 0, 3x - 4y - 13 = 0, 8x - 11y - 33 = 0$ are concurrent.

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12. If the straight lines $ax + by + c = 0, bx + cy = a = 0$ and $cx = ay + b = 0$ are concurrent, then prove that $a^3 + b^3 + c^3 = 3abc$

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13. A variable straight line drawn through the point of intersection of the straight lines $\frac{x}{a} + \frac{y}{b} = 1$ and $\frac{x}{b} + \frac{y}{a} = 1$ meets the coordinates axes at A and B. Show that the locus of the mid point of $\overline{AB}$ is $2(a + b)xy = ab(x + y)$.

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14. If a,b,c are arithmetic progression then show that the equation $ax + by + c = 0$ represents a family of concurrent lines and find the point of concurrency.

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15. Find the value of k if the angle between the straight lines $4x - y + 7 = 0, kx - 5y - 9 - 0$ is 45°

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16. Find the equation of the straight line passing through A(-1,3) and (i) parallel (ii) perpendicular to the straight line passing through B(2,-5),C(4,6)

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17. The equation of the straight line perpendicular to $5x - 2y = 7$ and passing through the point of intersection of the lines $2x + 3y = 1$ and $3x + 4y = 6$ is

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18. If $2x - 3y - 5 = 0$ is the perpendicular bisector of the line segment joining $(3, -4)$ and (α, β) then find $\alpha + \beta$.

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19. If the four straight lines $ax + by + p = 0, ax + by + q = 0, cx + dy + r = 0$ and $cx + dy + s = 0$ form a prallelogram. Show that the area of the

parallelogram so formed is

$$\left|\frac{(p-q)(r-s)}{bc-ad}\right|$$

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20. The hypotenuse of a right angled isosceles triangle has its ends at the points $(1, 3)$ and $(-4, 1)$. Find the equations of the legs of the triangle.

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21. A line is such that its segment between the lines $5x - y + 4 = 0$ and $3x + 4y - 4 = 0$ is bisected at the point (1,5). Obtain its equation.

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22. An equilateral triangle has its incentre at the origin and one side as $x + y - 2 = 0$. Find the vertex opposite to $x + y - 2 = 0$

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23. Find the orthocentre of the triangle whose vertices are $(-5, -7), (13, 2), (-5, 6)$

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24. Find the orthocentre of the triangle whose sides are $7x + y - 10 = 0, x - 2y + 5 = 0, x + y + 2 = 0$

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25. Find the circumcentre of the triangle whose vertices are (1,3) (-3,5) and (5,-1).

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26. Find the circumcentre of the triangle whose sides are $3x - y - 5 = 0, x + 2y - 4 = 0$ and $5x + 3y + 1 = 0.$

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27. Find the incenter of the triangle formed by the straight lines $y = \sqrt{3}x, y = -\sqrt{3}x$ and $y = 3$

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28. Find the equation of the straight line whose distance from the origin is 4, if the normal ray form the origin to the straight line makes an angle of 135° with the positive direction of the X-axis.

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29. Transform the equation $x + y + 1 = 0$ into Normal form.

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30. A straight line passing through $A(1, -2)$ makes an angle $\frac{\tan^{-1} 4}{3}$ with the positive direction of the X-axis in the anticlock wise sense. Find the point on the straight line whose distance from A is 5 units.

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31. Transform the equation $3x + 4y + 12 = 0$ into

slope intercept form

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32. Transform the equation $3x + 4y + 12 = 0$ into

intercept form

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33. Transform the equation $x + y + 1 = 0$ into Normal form.

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34. Find the angle between the lines $2x + y + 4 = 0$ and $y - 3x = 7$

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35. If $Q(h, k)$ is the foot of the perpendicular of $P(x_1, y_1)$ on the line $ax + by + c = 0$ then prove that $(h - x_1), a = (k - y_1), b = -(ax_1 + by_1 + c) : (a^2 + b^2)$.

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36. Find the distance between the parallel lines $3x + 4y - 3 = 0$ and $6x + 8y - 1 = 0$

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37. Find the condition for the points (a,0),(h,k) and (0,b) when $\neq 0$ to be collinear.

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38. Find the area of Δ^{le} formed by the straight line $x\cos\alpha + y\sin\alpha = p$ on the co-ordinate axes.

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Textual Exercises Exercise 3 A

1. Find the slope of the x + y = 0 and x - y = 0 .

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2. Find the equation of the containing the points

(2,-3) and (0,-3)

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3. Find the equation of the line containing the points $(1, 2)$ and $(1, -2)$

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4. Find the angle which the straight line $y = \sqrt{3}x - 4$ makes with the Y-axis.

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5. Write the equation of the reflection of the line $x = 1$ in the Y-axis.

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6. Find the condition for the points (a,0),(h,k) and (0,b) when $\neq 0$ to be collinear.

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7. Write the equations of the straight lines parallel to X-axis and (i) at a distance of 3 units above the X-axis.

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8. Write the equations of the straight lines parallel to X-axis and (i) at a distance of 4 units below the X-axis.

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9. Write the equations of the straight lines parallel to Y-axis and (i) at a distance of 2 units from the Y-axis to the right of it.

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10. Write the equations of the straight lines parallel to Y-axis and (i) at a distance of 5 units from the Y-axis to the left of it.

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11. Find the slopes of the straight lines passing through the following pair is points

$(-3, 8), (10, 5)$

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12. Find the slopes of the straight lines passing through the following pair is points

$(3, 4), (7, -6)$

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13. Find the slopes of the straight lines passing through the following pair is points

$(8, 1), (-1, 7)$

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14. Find the slopes of the straight lines passing through the following pair is points

$(-a, b), (b, -a)$

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15. Find the value of x if the slope of the line passing through (2,5) and $(x, 3)$ is 2.

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16. Find the value of y is the line joinint $(3, y)$ and $(2, 7)$ is parallel to the line joining the points $(-1, 4)$ and $(0, 6)$.

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17. Find the slopes of the lines (i) Parallel (ii) Perpendicular to the line passing through (6,3),(-4,5).

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18. Find the equation of the straight line, which make $\pi/4$ with the X-axis. y = x in the positive direction and which pass through the point (0,0)

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19. Find the equation of the straight line, which make $\pi/4$ with the X-axis. y = x in the positive direction and which pass through the point (0,0)

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20. Find the equation of the straight line, which make 135° with the X-axis in the positive direction and which pass through the point (3,-2).

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21. Find the equation of the straight line, which make 150° with the X-axis in the positive direction and which pass through the point (-2, -1).

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22. Find the equation of the straight line passing through the origin and making equal angles with the co-ordinate axes.

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23. Find the equation of the straight line which makes and angle 60° with the positive direction of x-axis and the y-intercept cut of by it is 3.

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24. The angle made by a straight line with the positive X-axis in the positive direction is 150° and Y-intercept cut off by it is 2. Find the equation of the line.

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25. The angle made by a straight line with the positive X - axis in the positive direction and the Y-intercept cut off by it are given below. Find the equation of the straight line.

$45^\circ, -2$

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26. The angle made by a straight line with the positive X - axis in the positive direction and the Y-intercept cut off by it are given below. Find the equation of the straight line.

$\tan^{-1}\left(\frac{2}{3}\right), 3$

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27. Find the equation of the straight line passing through (-4,5) and cutting off equal and non-zero intercepts on the co-ordinate axes.

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28. Find the equation of the straight line passing through the point $(-2, 4)$ and making intercepts whose sum is zero.

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29. Find the equation of the straight line passing through the ponts $(3, -4)$ and making X and Y- intercepts which are in the ratio $2:3$

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30. Find the equation of the straight line through the point (4,3) and perpendicular to the line passing through the points (1,1),(2,3).

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31. Show that the following sets of points are collinear and find the equation of the line passing through them

a. (-5,1)(5,5)(10,7)

b. (1,3)(-2,-6)(2,6)

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32. Show that the following sets of points are collinear and find the equation of the line passing through them

a. (-5,1)(5,5)(10,7)

b. (1,3)(-2,-6)(2,6)

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33. Prove that the points $(a, b+c), (b, c+a)$ and $(c, a+b)$ are collinear and find the equation of the straight line containing them.

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34. $A(10, 4), B(-4, 9)$ and $C(-2, -1)$ are the vertices of a triangle.Find the equations of

$\overline{AB}$

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35. $A(10, 4), B(-4, 9)$ and $C(-2, -1)$ are the vertices of a triangle.Find the equations of

the median through a

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36. $A(10, 4), B(-4, 9)$ and $C(-2, -1)$ are the vertices of a triangle.Find the equations of

the altitude through B

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37. $A(10, 4), B(-4, 9)$ and $C(-2, -1)$ are the vertices of a triangle.Find the equations of

The perpendicular bisector of the side $\overline{AB}$

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Textual Exercises Exercise 3 B

1. Find the sum of the squares of the intercepts of the line 4x-3y=12 on the axes of co-ordinate.

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2. If the portion of a straight line intercepted between the axes of co-ordinates is bisected at $(2p, 2q)$, write the equation of the

straight line.

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3. If the linear equations $ax + by + c = 0, (a, b, c \neq 0)$ and $lx + my + n = 0$ represent the same line and $r = \frac{l}{a} = \frac{n}{c}$, write the values of r in the terms m and b.

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4. Find the angle made by the straight line $y = -\sqrt{3}x + 3$ with the positive direction of the X-axis measured in the counter -clock wise direction.

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5. The intercepts of a straight line on the axes of co-ordinates are a and b.

If p is the length of the perpendicular drawn from the origin to this line. Write the value of p in terms of a and b.

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6. If p denotes the distance of the straight line from origin and α denotes the angle made by the normal ray drawn from origin to the straight line with $\overrightarrow{OX}$ measured in anti clockwise sense. Find the equations of the straight lines with the following values of p and α

$p = 5, \alpha = 60^\circ$

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7. If p denotes the distance of the straight line from origin and α denotes the angle made by the normal ray drawn from origin to the straight line with $\overrightarrow{OX}$ measured in anti clockwise sense. Find the equations of the straight lines with the following values of p and α

$p = 6, \alpha = 150^\circ$

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8. If p denotes the distance of the straight line from origin and α denotes the angle made by the normal ray drawn from origin to the straight line with $\overrightarrow{OX}$ measured in anti clockwise sense. Find the equations of the straight lines with the following values of p and α

$p = 1, \alpha = \frac{7\pi}{4}$

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9. If p denotes the distance of the straight line from origin and α denotes the angle made by the normal ray drawn from origin to the straight line with $\overrightarrow{OX}$ measured in anti clockwise sense. Find the equations of the straight lines with the following values of p and α

$p = 4, \alpha = 90^\circ$

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10. If p denotes the distance of the straight line from origin and α denotes the angle made by the normal ray drawn from origin to the straight line with $\overrightarrow{OX}$ measured in anti clockwise sense. Find the equations of the straight lines with the following values of p and α

$p = 0, \alpha = 0$

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11. If p denotes the distance of the straight line from origin and α denotes the angle made by the normal ray drawn from origin to the straight line with $\overrightarrow{OX}$ measured in anti clockwise sense. Find the equations of the straight lines with the following values of p and α

$p = 2\sqrt{2}, \alpha = \frac{5\pi}{4}$

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12. Find the equations of the straight lines in the symmetric form, given the slope and a point on the line

$\sqrt{3}, (2, 3)$

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13. Find the equations of the straight lines in the symmetric form, given the slope and a point on the line

$-\frac{1}{\sqrt{3}}, (-2, 0)$

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14. Find the equation of the straight line in the symmetric form in the following cases having the given slope -1 and passing through the given point (1,1)

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15. Transform the following equation into

a) Slope-intercept form

b) Intercept form and

c) Normal form

$3x + 4y = 5$

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16. Transform the following equations into

a. Slope intercpetform

b. Intercept form c. Normal form

$4x - 3y + 12 = 0$

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17. Transform the following equations into

a. Slope intercpetform

b. Intercept form c. Normal form

$\sqrt{3}x + y = 4$

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18. Transform the following equations into

a. Slope intercpetform

b. Intercept form c. Normal form

$x + y + 2 = 0$

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19. Transform the following equations into

a. Slope intercpetform

b. Intercept form c. Normal form

$x + y - 2 = 0$

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20. Transform the following equations into

a. Slope intercpetform

b. Intercept form c. Normal form

$\sqrt{3}x + y + 10 = 0$

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21. If the product of the intercepts make by the straight line $x\tan\alpha + y\sec\alpha = 1, \left(0 \leq \alpha < \frac{\pi}{2}\right)$, on the co-ordinates axes is equal to $\sin\alpha$, find α.

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22. If the sum of the reciprocals of the intercepts made by a variable straight line on the axes of coordinates is a constant, then prove that the line always passes through a fixed point.

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23. Line L has intercepts a and b on the axes of co ordinates. When the axes are rotated through a givenn angle, keeping the origin fixed, the straight line L has intercpets p and q on the transformed axes. Prove that $\frac{1}{a^2} + \frac{1}{b^2} = \frac{1}{p^2} + \frac{1}{q^2}$.

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24. Transform the equation $\frac{x}{a}+\frac{y}{b}=1$ into normal form where $a>0, b>0$. If the perpendicular distance of the straight line from the Origin is p then deduce that $\frac{1}{p^2}=\frac{1}{a^2}+\frac{1}{b^2}$

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25. A straight line passing through $A(-2,1)$, makes an angle of 30° with the positive direction of the X-axis. Find the points on the straight line whose distance from A is 4 units.

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26. Find the points on the line $3x-4y-1=0$ which are at a distance of 5 units from the point (3,2).

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27. A straight line whose inclination with the positive direction of the X-axis measured in the anti-clockwise sense is $\pi/3$ makes positive intercept on the Y-axis. If the straight lie is at a distance of 4 from the origin, find its equation.

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28. A straight line L is drawn through the point A(2,1) is such that its point of intersection with $x+y=9$ at distance of $3\sqrt{2}$ from A. Then angle made by L with positive direction of x-axis is

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29. A straight line L with negative slope passes through the point (8,2) and cuts positive co-ordinate axes at the points P and Q. Find

the minimum value of $OP + OQ$ as L varies where O is the origin.

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Textual Exercises Exercise 3 C

1. Find the ratio in which the following straight lines divide the line segments joining the given points. State whether the points lie on the same side or on either side of the straight line

$3x - 4y = 7, (2, -7)$ and (-1,3)

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2. Find the ratio in which the following straight lines divide the line segments joining the given points. State whether the points lie on the same side or on either side of the straight line

$3x - 4y = 7, (2, -7)$ and (-1,3)

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3. Find the ratio in which the following straight lines divide the line segments joining the given points. State whether the points lie on the same side or on either side of the straight line

$2x + 3y = 5$, $(0, 0)$ and (-2,1)

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4. Find the point of intersection of the lines

$4x + 8y - 1 = 0, 2x - 8y + 1 = 0$

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5. Find the point of intersection of the lines

$5x - 3y - 3 = 0, 4x + y - 1 = 0$

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6. Show that the straight lines $(a-b)x+(b-c)y=c-a, (b-c)x+(c-a)y=a-b$ and $(c-a)x+(a-b)y=b-c$ are concurrent.

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7. Transform the following equations intothe form $L_1+\lambda L_2=0$ and find the point of concurrency of the family of straight lines represented by the equation

$(2+5k)x-3(1+2k)y+(2-k)=0$

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8. Transform the following equations intothe form $L_1+\lambda L_2=0$ and find the point of concurrency of the family of straight lines

represented by the equation

$(2+5k)x-3(1+2k)y+(2-k)=0$

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9. Find the value of p if the straight lines $x+p=0, y+2=0, 3x+2y+6=0$ are concurrent.

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10. Find the area of the triangle formed by the following straight lines and the coordinate axes.

$x-4y+2=0$

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11. Find the area of the triangle formed by the line $3x - 4y + 12 = 0$ with the coordinate axes.

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12. A straight line meets the coordinate axes in A and B. Find the equation of the straight line when $\overline{AB}$ is divided in the ratio $2:3$ at $(-5, 2)$

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13. A straight line meets the co-ordinate axes at A and B. Find the equation of the straight line, when $\overline{AB}$ is divided in the ratio $1:2$ at $(-5, 4)$

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14. A straight line meets the co-ordinate axes at A and B. Find the equation of the straight line, when

(p, q) bisects $\overline{AB}$.

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15. Find the equation of the straight line passing through the points $(-1, 2)$ and $(5, -1)$ and also find the area of the triangle formed by it with the axes of coordinates.

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16. A triangle of area 24 sq. units is formed by a straight line with the coordinate axes in the first quadrant. Find the equation of the straight line, if it passes through (3,4).

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17. A straight line with slope 1 passes through Q(-3,5) and meets the straight line x+y-6=0 at P. Find the distance PQ.

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18. Find the set of values of a if the points $(1, 2)$ and $(3, 4)$ lie to the same side of the straight line $3x - 5y + a = 0$

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19. Show that the lines$2x + y - 3 = 0, 3x + 2y - 2 = 0$ and $2x - 3y - 23 = 0$ are concurrent and find the point fo concurrency.

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20. Find the value of p, if the lines 3 x + 4 y = 5 , 2 x + 3y = 4 , px + 4y = 6 are concurrent.

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21. Find the value of 'p' if the lines $4x - 3y - 7 = 0, 2x + py + 2 = 0$ and $6x + 5y - 1 = 0$ are concurrent .,

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22. Determine whether or not the four straight lines with equations $x + 2y - 3 = 0, 3x + 4y - 7 = 0, 2x + 3y - 4 = 0, 4x + 5y - 6 = 0$ are concurrent.

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23. If $3a + 2b + 4c = 0$ then show that the equation $ax + by + c = 0$ represents a family of concurrent straight lines and find the point of concurrency.

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24. If non zero numers a,b,c are in harmonic progression, the show that the equation $\frac{x}{a} + \frac{y}{b} + \frac{1}{c} = 0$ represents a family of concurrent lines and find the point of concurrency.

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25. Find the point on the straight line $3x + y + 4 = 0$ which is equidistant from the points (-5,6) and (3,2).

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26. A straight line through $P(3, 4)$ makes an angle of 60° with the positive direction of the X-axis. Find the coordinates of the points with the line whre are 5 units away from P.

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27. A straight line through $Q(\sqrt{3}, 2)$ makes an angle $\pi/6$ with positive direction of the X-axis. If the straight line intersects the line $\sqrt{3}x - 4y + 8 = 0$ at P, find the distance PQ.

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28. Show that the origin is within the triangle whose angular ponts are $(2, 1), (3, -2), (-4, -1)$.

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29. A straight line through $Q(2, 3)$ makes an angle $\frac{3\pi}{4}$ with the negative direction of the x-axis. If the straight line intersects the line $x + y - 7 = 0$ at P, find PQ.

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30. Show that the straight lines $x + y = 0, 3x + y - 4 = 0$ and $x + 3y - 4 = 0$ form an isosceles triangle.

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31. Area of the triangle formed by the lines $2x - y - 5 = 0, x - 5y + 11 = 0, x + y - 1 = 0$ is

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Textual Exercises Exercise 3 D

1. Find the value of k if the angle between the straight lines $4x - y + 7 = 0, kx - 5y - 9 - 0$ is 45°

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2. Find the angle between the lines

$3x + 5y = 7, 2x - y + 4 = 0$

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3. Find the angle between the lines

$y = -\sqrt{3}x + 5, y = \frac{1}{\sqrt{3}}x - \frac{2}{\sqrt{3}}$

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4. Find the angle between the lines

$ax + by = a + b, a(x - y) + b(x + y) = 2b$

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5. Find the length of the perpendicular drawn from the point given against the following straight lines.

$5x - 2y + 4 = 0, (- 2, \ - 3).$

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6. Find the length of the perpendicular drawn from the point given against the following straight lines.

$3x - 4y + 10 = 0, (3, 4)$

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7. Find the length of the perpendicular drawn from the point given against the following straight lines.

$x - 3y - 4 = 0, (0, 0)$

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8. Find the distance between the parallel lines $3x - 4y = 12$ and $3x - 4y = 7$

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9. Find the distance between the parallel to the lines 5x-3y-4=0,10x-6y-9=0

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10. Find the equation of the straight line parallel to the line $2x + 3y + 7 = 0$ and passing through the point $(5, 4)$.

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11. Find the equation of the straight line perpendicular to the line $5x - 3y + 1 = 0$ and passing through the point $(4, -3)$.

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12. Find the value of k if the straight lines $6x - 10y + 3 = 0$ and $kx - 5y + 8 = 0$ are parallel.

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13. Find the value of p, if the straight lines $3x + 7y - 1 = 0$ and $7x - py + 3 = 0$ are mutually perpendicular.

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14. Find the value of k, if the straight lines y-3kx+4=0 and (2k-1)x-(8k-1)y-6=0 are perpendicular.

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15. $(-4, 5)$ is a vertex of a square and one of its diagonals is $7x - y + 8 = 0$. Find the equation of a the other diagonal.

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16. Find the equation of the straight line passing through A(-1,3) and (i) parallel (ii) perpendicular to the straight line passing through B(2,-5),C(4,6)

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17. The line $\frac{x}{a} - \frac{y}{b} = 1$ meets the X-axis at P. Find the equation of the line perpendicular to this line at P.

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18. Find the equation of the line perpendicular to the line $3x + 4y + 6 = 0$ and making intercept -4 on X-axis.

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19. $A(-1,1), B(5,3)$ are opposite vertices of a square in the XY-plane. Find the equation of the other diagonal (not passing through A,B) of the square.

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20. Find the foot of the perpendicular drawn from (4,1) upon the straight line $3x-4y+12=0$.

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21. Find the foot of the perpendicular drawn from (3,0) upon the straight line $5x+12y-41=0$.

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22. $x - 3y - 5 = 0$ is the perpendicular bisector of the line segment joining the points A,B. If $A = (-1, -3)$, find the co ordinates of B.

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23. Find the image of (1,2) in the straight line $3x + 4y - 1 = 0$

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24. Show that the distance of the point (6,-2) from theline $4x + 3y = 12$ is half the distance of the point (3,4) from the line $4x - 3y = 12$.

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25. Find the locus of the foot of the perpendicular from the orign to a variable straighht line which always passes through the fixed point (a, b).

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26. Show that the lines $x - 7y - 22 = 0, 3x + 4y + 9 = 0$ and $7x + y - 54 = 0$ form a right angled isosceles triangle.

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27. Find the equation of the straight lines passing through the point $(-3, 2)$ and making an angle 45° with the straight line $3x - y + 4 = 0$

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28. Find the angles of the triangle whose sides are $x + y - 4 = 0, 2x + y - 6 = 0, 5x + 3y - 15 = 0$

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29. Prove that the feet of the perpendicular from the origin on the lines $x + y = 4, x + 5y = 26, 15x - 27y = 424$ are collinear.

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30. Find the equations of the line passing through the point of intersection of the lines $3x + 2y + 4 = 0, 2x + 5y = 1$ and whose distance from $(2, -1)$ is 2.

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31. Each sides of a square is of lemgth 4 units. The centre of the square is $(3, 7)$ and one of its diagonals is parallel to $y = x$. Find the co-ordinates of its vertices.

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32. If $ab > 0$ find th area of the rhombus enclosed by the four straight lines $ax \pm by \pm c = 0$

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33. Find the area of the parallelogram whose sides are $3x + 4y + 5 = 0, 3x + 4y - 2 = 0, 2x + 3y + 1 = 0, 2x + 3y - 7 = 0$

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34. A person standing at the juction (crossing) of two straight paths represented the equations $2x - 3y + 4 = 0$ and $3x + 4y - 5 = 0$ wants to reach the path whose equation is $6x - 7y + 8 = 0$ in the least time. Find the equation of the path that he should follow.

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35. A ray of light coming from the point (1,2) is reflected at a point A on the axes of x and then passes through the point (5,3). Find the co ordinates of the point A.

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Textual Exercises Exercise 3 E

1. Find the incentre of the Δ^{le} with the vertices $(1, \sqrt{3})$,(0,0) and (2,0)

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2. Find the orthocentre of the triangle whose sides are given by $x + y + 10 = 0, x - y - 2 = 0$ and $2x + y - 7 = 0$

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3. The orthocentre of the triangle whose sides are given by $4x - 7y + 10 = 0, x + y - 5 = 0$ and $7x + 4y - 15 = 0$

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4. Find the circumcentre of the triangle whose sides are $3x - y - 5 = 0, x + 2y - 4 = 0$ and $5x + 3y + 1 = 0.$

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5. The incentre of the triangle formed by the lines $x + y = 1, x = 1, y = 1$ is

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6. Find the circumcentre of the triangle whose vertices are A(1,0),B(-1,2) and C(3,2)

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7. Find the value of k if the angle between the straight $kx + y + 9 = 0, 3x - y + 4 = 0$ is $\pi/4$

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8. Find the equation of the straight line passing through (0,0) and also through the point of intersection of lines $2x - y + 5 = 0, x + y + 1 = 0.$

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9. Find the equation of the straight line parallel to $3x + 4y = 7$ and passing through the point of intersection of the lines $x - 2y - 3 = 0$ and $x + 3y - 6 = 0.$

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10. The equation of the straight line perpendicular to the straight line $3x + 2y = 0$ and passing through the point of intersection of the lines $x + 3y - 1 = 0$ and $x - 2y + 4 = 0$ is

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11. Find the equation of the straight line making non zero equal intercepts on the co ordinate axes and passing through the point of intersection of the lines $2x - 5y + 1 = 0$ and $x - 3y - 4 = 0$.

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12. Find the point of intersection of the lines

$4x + 8y - 1 = 0, 2x - 8y + 1 = 0$

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13. Find the value of a if the distances of the points $(2, 3)$ and $(-4, a)$ from the straight line $3x + 4y - 8 = 0$ are equal.

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14. Find the circumcentre of the triangle formed by the lines $x + y = 0, 2x + y + 5 = 0$ and $x - y = 2$

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15. If θ is the angle between the lines $\frac{x}{a} + \frac{y}{b} = 1$ and $\frac{x}{b} + \frac{y}{a} = 1$ find the value of $\sin\theta$.

when $a > b$.

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16. Find the equation of the straight lines passing through the point $(-10, 4)$ and making an angle θ with the line $x - 2y = 10$ such that $\tan\theta = 2$.

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17. Find the equation of the straight lines passing through the point $(1, 2)$ and making an angle of 60° with the line $\sqrt{3}x + y + 2 = 0$

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18. The base of an equilateral triangle x + y = 2 = 0 and opposite vertex is (2 , - 1). Find the equations of the remaining sides .

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19. Find the orthocentre of the triagle whose vertices are $(-2, -1)(6, -1), (2, 5).$

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20. Find the orthocentre of the triangle whose vertices are $(5, -2), (-1, 2), (1, 4).$

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21. Find the circumcenter of the triangle whose vertices are (-2,3) , (2 , -1) , (4 , 0) .

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22. Find the circumcentre of the triangle whose vertices are (1,3) (0,-2) and (-3,1).

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23. Let PS be the median of the triangle with vertices $P(2, 2), Q(6, -1)$ and $R(7, 3)$. Find the equation of the straight line passing through (1,-1) and parallel to the median PS.

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24. Find the orthocentre of the triangle formed by the lines $x + 2y = 0, 4x + 3y = 5$ and $3x + y = 0$

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25. Find the circumcentre of the triangle whose sides are given by $x + y = 0, 2x + y + 5 = 0$ and $x - y = 0$

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26. Find the equations of the straight lines passing through (1,1) and which are at a distance of 3 units from (-2,3).

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27. If p and q are the lengths of the perpendiculars from the origin to the straight lines $x \sec \alpha + y \operatorname{cosec} \alpha = a$ and $x \cos \alpha - y \sin \alpha = a \cos 2\alpha$, prove that $4p^2 + q^2 = a^2$

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28. Two adjacent sides of a parallelogram are given by $4x + 5y = 0, 7x + 2y = 0$ and one diagonal is $11x + 7y = 9$. Find the equations of the remaining sides and the other diagonal.

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29. Find the incentre of the triangle formed by the straight lines $x + 1 = 0, 3x - 4y = 5, 5x + 12y = 27.$

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30. Find the incentre of the triangle formed by the straight lines $x = 1, y = 1, x + y = 1.$

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31. A triangle is formed by the lines $ax + by + c = 0, lx + my + n = 0$ and $px + qy + r = 0$. Given that the triangle is not right angled, show that the straight line $\frac{ax + by + c}{ap + bq} = \frac{lx + my + n}{lp + mq}$ passes through the orthocentre of the triangle.

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32. The Cartesian equation of the sides BC,CA, AB of a triangle are respectively $u_1 = a_1x + b_1y + c_1 = 0, u_2 = a_2x + b_2y + c_2 = 0$ and $u_3 = a_3x + b_3y + c_3 = 0$. Show that the equation of the straight line through A bisectig the side $\overline{BC}$ is $\frac{u_3}{a_3b_1 - a_1b_3} = \frac{u_2}{a_1b_2 - a_2b_1}$

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